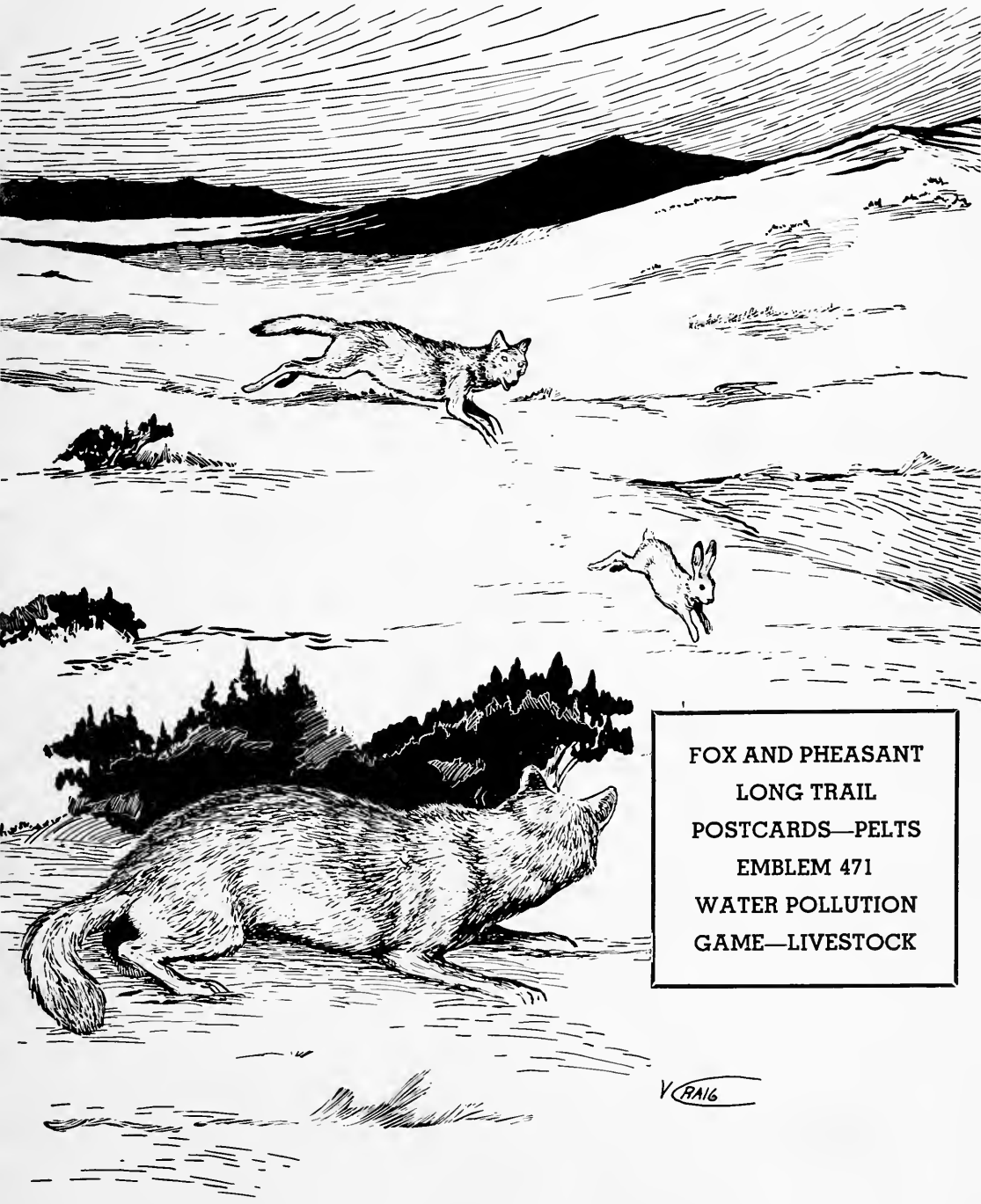
MONTANA Wildlife

April, 1958—Montana Fish and Game Department Official Publication



FOX AND PHEASANT
LONG TRAIL
POSTCARDS—PELTS
EMBLEM 471
WATER POLLUTION
GAME—LIVESTOCK

In Memoriam

M. R. (Bill) Ammerman, Montana Game Warden-Pilot, met an untimely death on the evening of February 13, 1958 in the course of official duties. He was flying one of the department's light planes when he struck a power line near Glasgow.

Bill was born in St. Ignatius in 1920. His education was attained in Missoula schools and he served 57 months with the U. S. Army.

Bill started with the Fish and Game Department as Game Warden at Superior in 1948 and was later transferred to Glasgow as warden-pilot.

At the time of his death, he was working as warden-pilot with headquarters at Malta.

He is survived by his widow, Opal, and his children, Gayle and Bill.

The personnel of the Fish and Game Department and the sportsmen of Montana join in expressing sympathy for this loss to his family and to the cause of conservation.

MONTANA FISH AND GAME DEPARTMENT

Official Publication

STATE OF MONTANA

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FISH AND GAME COMMISSION

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Montana Wildlife

Vernon Craig, Editor

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McKEE PRINT.

A Sportsman's Letter To His Son

TO MY SON:—

Yesterday you asked permission to borrow my twelve gauge gun, and in loaning it to you I wish I could convey to you, for your enjoyment, the memories that attach to this faithful old friend of more than a score of years.

I wish I could loan you the smell of the marshes at sunrise, the vision of dawn stealing from the East through the passes and canyons of the mountains, as I have experienced them in company with this faithful old companion. It has been my eye alone through more than twenty years that has glanced along the rib between the barrels, now bright and shining from use, my finger that has pressed the trigger and for me alone that it has spoken when called upon.

I wish I could loan you the memories of silent night camping beneath the stars; of frosty morning air around a warm bed; the aroma of sage burning under steaming coffee and the companionship of many good fellows who have since been called home to hunt no more.

To accompany this gun you should also have memories of a faithful pointer over whose white and liver back I have poured number eights into brown flashes of lightning on the uplands of this once great hunting country.

I never used my gun as an excuse to play poker or booze, but rather it has led me out to enjoy nature's vast storehouse of secrets, and through these to grope for Nature's God. I commend it to you in that same spirit, not the desire alone to kill, but let it be the beckoning figure leading you into closer communion with the great and wholesome out-of-doors.

YOUR DAD

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THE FOX AND THE PHEASANT

By David A. Arnold, Michigan Department of Conservation
Illustrated by Oscar Warback

ED. NOTE:

Over the past few years there has been a marked increase of Red Fox in Montana, roughly correlated and possibly resulting from the decline in coyote numbers. Be that as it may, many sportsmen are becoming apprehensive of pheasant-fox relationships.

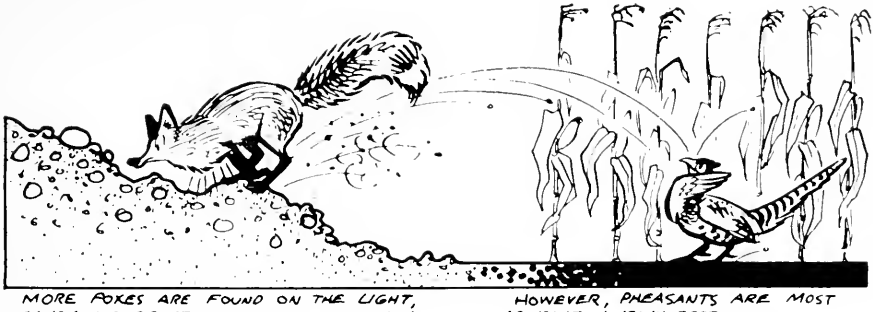
This problem, new to Montana, has been experienced in many other states where there have been considerable numbers of red fox for many years.

Since the problem is new to Montana, no extensive studies regarding red fox have been conducted here; however, we do have a vast storehouse of facts gleaned from many years of investigations in other parts of the U. S. Basically, the biological relationships under discussion remain the same the country over.

Following is one chapter reprinted from "Red Foxes of Michigan." It is submitted respectfully for what we may learn from the comprehensive endeavors of others.

Michigan pheasants were booming in the early forties. We may not have had all the pheasants we wanted as hunters, but possibly we had all we needed and could put up with as farmers. But the pheasant boom like many others "busted" and then came the pheasant depression. The depression came not only to the swales of Michigan but to nearly every pheasant hunting ground east of the Rockies. Theories of the cause were numerous, but very little was actually known. Solutions for the trouble were nearly as numerous as ideas of the cause, and one of the most common recommendations for halting the pheasant decline was to get rid of the red fox. Biologists were skeptical of this remedy, to say the least, but the poor old fox had picked a very inopportune time to increase so conspiciously in Michigan's pheasant range. His presence, in quantity, in areas where only a few years before he had been almost unknown was more than enough to bring the wrath of the sportsmen down on his little red head. The circumstantial evidence was admittedly strong and the fox was convicted. The sentence—the fox bounty. Biologists know now that the fox was not guilty of this particular crime, but unraveling the case required much more than casual investigation.

In the first place, foxes do eat pheasants. Foxes became numerous in pheasant range near the end of the peak years for pheasant hunting, and shortly after the fox became abundant, pheasants began to decline. This was the case against the fox and it was indeed popular to accuse him. But even before formal investigation of the case started, considerable evidence threw reasonable doubt on Reynard's alleged guilt. The first evidence in his favor was that pheasants had also declined in isolated areas where there were no foxes. These declines in foxless areas occurred at the same time and with a severity equal to that experienced in the areas of Michigan where foxes were abundant. This characteristic



MORE FOXES ARE FOUND ON THE LIGHT, SANDY, AND GRAVELLY SOILS IN MICHIGAN.

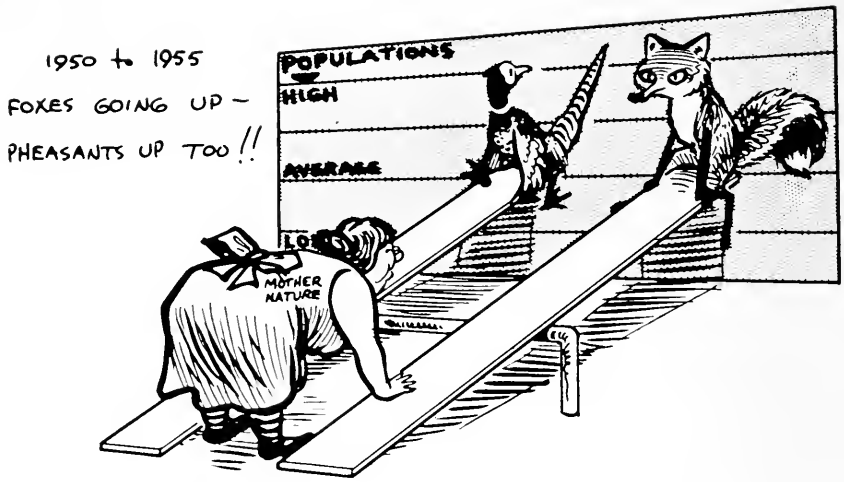
HOWEVER, PHEASANTS ARE MOST ABUNDANT IN HEAVY, FERTILE SOILS.

of the drop strongly suggested that something other than foxes was removing pheasants. On Pelee Island, a pheasant paradise in Lake Erie, where there are not, and were not any foxes, pheasants went into a serious slump. Foxless areas in South Dakota, the nation's pheasant capital, showed the same pheasant depression as did parts of that state that has lots of foxes.

The claim was made that pheasants went down when foxes came up. But later biological studies showed that the pheasant decline was not related to the fox increase in Michigan. Foxes, after their long increase, were declining for two years before pheasants hit the bottom of the slump.

The type of country where most Michigan foxes thrive was found to be unlike land on which pheasants reached their highest numbers. Ideal pheasant country is rich farmland where soils are heavy and fertile and often poorly drained. Foxes, on the other hand, seem to do best on lighter, sandy gravelly soils where cultivation is not as intense, where brushy areas and woodlands are numerous, and where hills and ridges dominate the landscape. In short, country that is encouraging to pheasants is discouraging to foxes. In Michigan, pheasants declined in areas where foxes were comparatively scarce just as they did in areas where foxes are abundant.

The growth of the pheasant population since its low point at a time when the fox population continued high shows that foxes are of only minor importance, if important at all to pheasants. Pheasants reached their lowest point in 1947. Since that year there has been a steady recovery and 1953, 1954 and 1955 saw the harvest of more than a million cocks each year. Meanwhile, the fox was still here in goodly numbers. Fox numbers receded somewhat after the peak year in 1945 but only a little. The population remained high —much higher than during the high pheasant years of the early forties. And in the years when pheasants were reaching their best numbers since the slump, foxes were steadily increasing. In 1954 more foxes were present in the pheasant range than at any time since 1945. In fact, foxes increased 55 percent from 1953 to 1954 while pheasants also increased



during these two years. It would seem that if foxes were responsible for the pheasant slump, pheasants would go down as foxes came up. This, however, has not been the case.

Population trends and the distribution of foxes and pheasants should be sufficient evidence to exonerate the fox, but biologists sought further evidence. They started an investigation of pheasant-eating foxes to determine whether foxes are responsible for poor pheasant hunting. Studies in areas where both foxes and pheasants live have been carried on for a number of years. Studies were made winter and spring of the habits of the fox in taking pheasants. The welfare of pheasants throughout the year has been constantly checked and the food of the fox at all seasons of the year has been investigated.

In the winter study, we followed fox trails on fresh snow in the pheasant range. Michigan's pheasant range is, generally, the southern third of the state. Some areas have more pheasants than others. For this reason, we trailed foxes in different areas, where pheasant densities were different. Pheasants were censused and the effect of the foxes on the pheasant population determined. Biologists trailed foxes 1,000 miles. The walk was long, but the results are conclusive.

Fox tracks were followed until the fox was jumped. There was no point in following him farther because from there on he would be running and not hunting.

Biologists following the trails measured the distance by carrying pedometers in their pockets. The 1,000 miles of tracking were thus actually measured. Records of everything foxes did were kept, records of all pheasants flushed or seen were kept, records were made of all other game seen, and records of all signs of game were put into the notes.

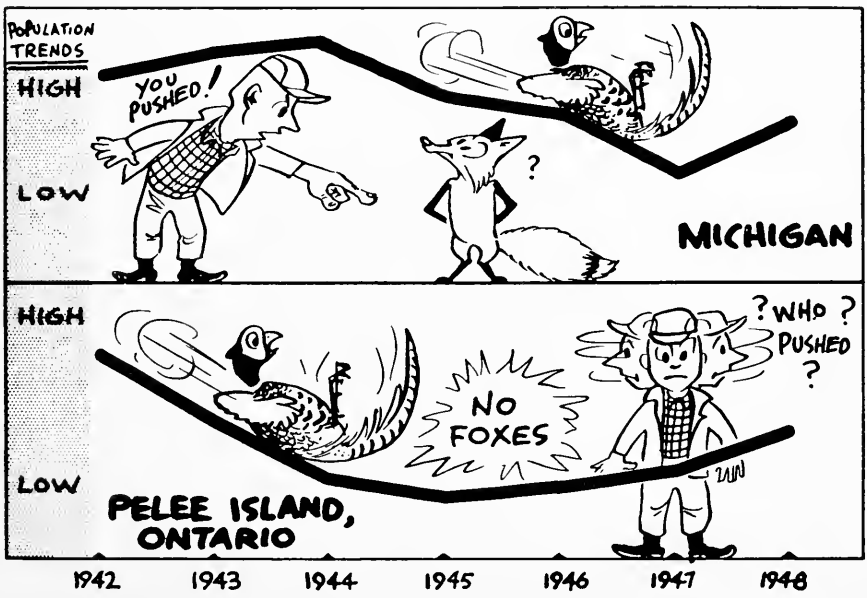
In view of everything we have been able to learn about foxes and pheasants it appears that it wouldn't do much good to try to increase the birds by controlling foxes.

In order to find out for sure if killing foxes would help pheasant hunting the New York Department of Conservation tried an experiment. They selected two areas as nearly similar as possible. For 20 months, they trapped foxes in one area and left foxes alone on the other. At the same time they kept track of the number of pheasants and foxes on the two areas. They counted fox tracks on both areas with low-flying airplanes and by cars in order to measure the effectiveness of the control efforts.

On the trapped area foxes were reduced 75 to 80 percent from what they were at the beginning of the study. Before this reducing effort began, fox populations on both areas were nearly equal. The trapped area was isolated by the Finger Lakes and a river.

At the end of the experiment the New York biologists found that pheasant populations changed very little. Hunting was no better on the trapped area than on the area where there were four times as many foxes. They concluded that fox control wasn't the answer to better pheasant hunting and the high cost of such control was far above any benefits that may have been derived.

All these studies, in Michigan, New York, and in many other states point to the fact that foxes don't influence our pheasant hunting enough to get excited over.



THE LONG TRAIL

By KEN THOMPSON

A beaver poacher sat before his tent in the middle fork of the Flathead. He had made a big catch and was serenely fleshing a large pelt. After years of dodging the law he had learned to operate with the cunning of a hunted animal. He followed the trails used by elk, leaving little evidence of human tracks. His base camp lay concealed on a bushy island in the river, forty miles back in the wilderness. A police dog lay at his side and at the slightest indication from the dog, all of the evidence would be dumped into the river. There wasn't a chance of anyone finding him with this rich catch of illegal pelts.

He nearly fell off the log when a voice at his side said, "Well, I see you have been doing pretty good."

"Why XO?!! O'Claire, how in XOXXI did you find me?" the poacher cursed roundly, then concluded, "Well, I guess we might as well head for town."

And head for town they did, forty miles or more to the nearest road.

Deputy Game Warden O'Claire carried 60 pounds of illegal beaver on his back. The violator, burdened by nothing more than his own calloused conscience, trudged along amiably. After all it was a gamble and he had lost but he wasn't about to help tote the illegal evidence.

Thirty five years ago when Archie started with the Fish and Game Department most of his district was back country.

Thus it was in the early days of game law enforcement in Montana. It was a big rough country and very few roads. You could go anywhere you wanted on foot. One of the persons who has seen much of the state on foot in the course of his duties is the department's retiring director, A. A. O'Claire. To most of the states 200,000 sportsmen he is known as Archie and on June 1st, he will have completed 35 years of service with the department.

During the period of his professional career, Archie has seen and helped the department grow from a small beginning to a million dollar organization responsible for maintaining one of Montana's most important industries—recreation.

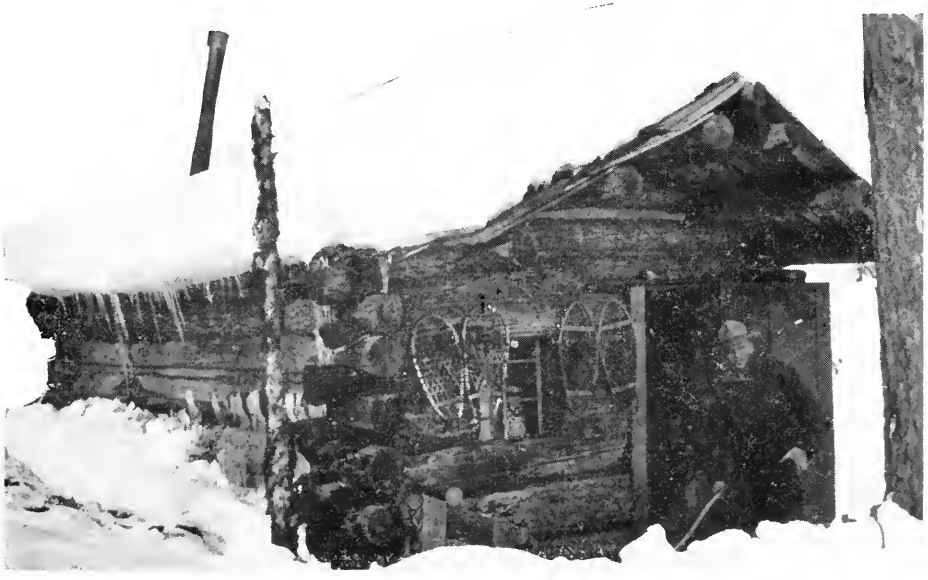
A. A. O'Claire started with the fisheries division, working at a spawn taking station in 1920. A year later he became a regular deputy game warden with his own district. And what a district it was, covering everything from the Canadian border about to Missoula and all of the area from the Continental Divide to Libby.

Early days with the game department were uncertain and Archie recalls one year when the department income dropped from $120,000 to $102,000. In those days the department did not have an emergency reserve to handle drops in income. So being the youngest man on the force, he first received a letter saying no expenses would be allowed, and the next day a letter came advising that his salary would also be discontinued.

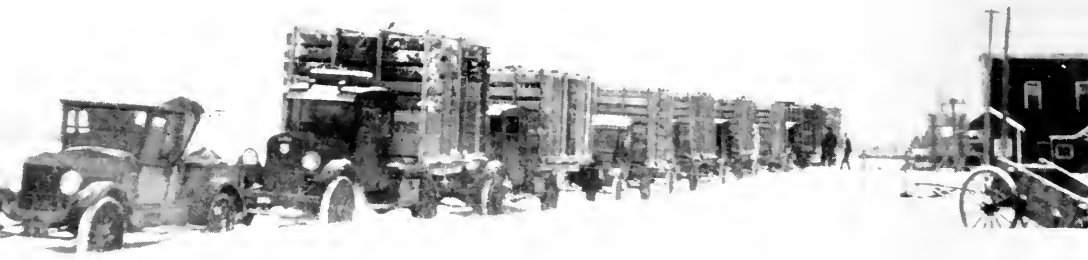
Memories of this type have caused Director O'Claire to insist that today's fish and game department have an emergency cash reserve to handle unforseen situations without jeopardizing the department's essential program.

In 1941 when funds from the Wildlife Restoration Act made it possible for Montana to increase its program of wildlife research study and development, O'Claire was given the job of heading the fur research project. His knowledge of the back country and of fur-bearing animals served him well in completing this job.

The biggest jump in Archie's career came in 1945 when he was asked to head Montana's growing Fish and Game Department. This he



Not "plush" quarters but a welcome sight after long, weary miles on snowshoes.



Game Warden O'Claire's Model T breaks trail for an elk transplant caravan in January, 1927. It took 13 days to haul the elk from Moiese Bison Range to the Fisher River.

did until 1949 when he resigned in order to handle some private business, but in 1953 he was again asked to head the state's wildlife program. In this executive position, Director O'Claire has been an important part of the progress shown by the department.

Chow Time On The Trail

Airplanes have replaced Model T's. Professionally trained people make up a bulk of the department's personnel and the financial activities are recorded by an accounting division that makes an extensive use of modern business machines.

Today, the beaver poacher would be spotted from the air and a radio message would send men in quickly to apprehend the violator. Everything has been streamlined to meet modern conditions and Archie has made significant contributions in this advancement.

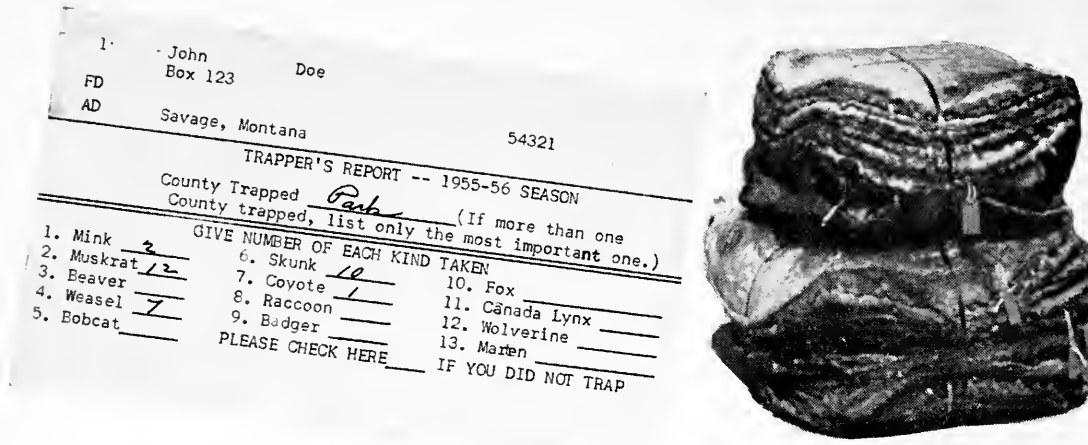
Director O'Claire has served his country as well as his native state. At the age of 18 he served in the army on the Mexican Border Patrol. World War I found him in the trenches from the Argonne to the second battle of the Marne and through the St. Mihiel, Meuse, Argonne campaigns. Again, in World War II he entered active service and emerged as a captain of the infantry.

Lt. O'Claire's coming home aboard the Battleship U.S.S. Missouri at the end of World War I, May 30, 1919.

Like all successful persons, Archie gives credit to his wife Viva for the part she has played in the progress he has made. Mrs. O'Claire, a charming person, is an expert hand with a tractor, and can turn out a fine meal over a campfire. Versatility is a requirement of the fish and game wives and "Vi" qualifies in all categories.

Montana's history has been forged by rugged, resourceful people. Each has contributed unsparingly of his strength and talents. As our fish and game department moves forward into a complex, demanding future we can thank such pioneers as Archie O'Claire that the foundation has been solidly built.

A. A. O'Claire retiring director of the Montana Fish and Game Department after 35 years service.


1· John Doe
FD Box 123
AD Savage, Montana 54321
TRAPPER'S REPORT -- 1955-56 SEASON
County Trapped Park (If more than one County trapped, list only the most important one.)
GIVE NUMBER OF EACH KIND TAKEN
1. Mink 3
2. Muskrat 12
3. Beaver
4. Weasel 7
5. Bobcat
6. Skunk 10
7. Coyote 1
8. Raccoon
9. Badger
PLEASE CHECK HERE IF YOU DID NOT TRAP
10. Fox
11. Canada Lynx
12. Wolverine
13. Marten

POST CARDS AND PELTS

By Fletcher Newby—Fur Resources Biologist

Management of Montana's fur resource requires the efforts and cooperation of many people. Trappers and fur buyers, farmers and ranchers, game wardens and biologists—all have a stake in the successful management of fur animals.

One of the things the manager or biologist must know in order to properly manage fur animals is the annual catch or harvest of fur-bearers removed by trappers. Obviously, one of the best places to learn this is from the trapper himself. Each spring, all the licensed trappers in the state receive a postal card bearing a printed form. Spaces are provided for the trapper to report his take of fur animals and predators and the county in which he did most of his trapping. A letter of explanation goes with each card and describes the need for knowing his success. Results of the previous year's survey and other informative materials are also included. Return of the card is entirely voluntary.

Numbers of licensed trappers vary from year to year, but the percentage of cards returned has been very constant in the six years this survey has been conducted. Many times mail questionnaires bring a good response in the first year or so but as time passes each succeeding year indicates a progressive loss of interest. Montana trappers are to be commended for their interest and cooperation in maintaining this relatively high rate of return.

It is only fitting in this modern age of science that electronics should enter into the science of wildlife management. Handling of the mail survey would be a much more difficult and less effective task if it were not for the use of modern office machines. Addressing of envelopes for mailing the cards and printing of names and addresses on the postal cards is done with electric accounting machines—distant cousins of the electronic brains used in missile research. When the cards are returned,

the data are numerically coded and punched in analysis cards. Compilations which would take weeks of hand work are made from these cards in hours by the machines.

One of the most valuable calculations made from this survey is the total catch of various species made in different areas of the state. We also find out just how many trappers actually use their licenses—this varies from year to year, depending largely upon economic conditions. In addition we can compute the number of trappers catching a given species and the average catch of that species.

The question naturally arises in the minds of many people—How can you be sure that figures calculated on the basis of a 54 per cent return are really correct? What about the other 46 per cent who didn't respond? Without some kind of an accuracy check we couldn't be certain; however, such checks have been made by compiling information from fur dealer and shipping permit records and by sending a second card to those trappers not replying to the first request. These checks have shown that figures calculated from results of the first mailing are surprisingly accurate for those animals managed on the basis of this information—mink, muskrats and otter. Beaver and marten are managed from more complete information from other sources.

When mail survey information is added to data on weather, fur prices, unemployment and findings from biological research, a rather complete

MONTANA TRAPPER REPORT ANALYSIS (1957)

Species	No. of Pelts	Average Price
Mink	7,964	$15.12
Muskrat	28,663	0.54
Beaver	9,812	7.01
Weasel	962	0.63
Bobcat	808	3.16
Skunk	2,329	0.63
Coyote	100	1.00
Raccoon	468	1.57
Badger	183	0.65
Fox	136	2.21
Canada Lynx	45	5.00
Wolverine	4	20.00
Marten	494	5.65
Otter	62	17.71

picture is gained of the forces which affect trapping pressure. The job of management is to regulate this pressure in such a way that an adequate breeding stock is preserved while trappers reap an annual crop of pelts. Comparing this information from year to year and from area to area makes it possible to judge the results of changes in seasons and regulations and to plan for better ones.

Another use of the mail survey is in mapping the distribution of fur animals and predators. Questionnaires requesting more exact information are sent to trappers showing a catch of the particular animal of interest. The recent invasion of eastern Montana by the red fox and the westward movement of the raccoon have been plotted by this method.

The mail survey is an encouraging example of how it is possible for the public and the Department to work together toward wise use of a wildlife resource. It is recognized that the market demand for pelts regulates trapping activity to a considerable extent, but management can do much to offset extremes in trapping pressure. Excessive pressure on valuable species can be reduced by increased restrictions while interest in low priced pelts can be stimulated by more liberal regulations. Well managed, this resource can continue to contribute much recreation and income to Montanans.

—Photo by George Holton

Skull-Duggery

While we slap mosquitos and others strain to control insect pests, the hairy fellow pictured here on a skull is busily doing his bit to aid science. He is the immature or larval form of the skin beetle (Dermestid) and is employed by the Fish and Game Department Wildlife Investigations Laboratory to clean clinging remains of flesh from animal bones used in game management studies.

Considerable care is required to maintain healthy breeding colonies of these insects. They require darkness with carefully controlled temperature and humidity. Four to five days and hundreds of insects are necessary to clean one skull. The larva are the gluttons while the adults (upper left) eat very little. Cleaning is completed with rinsing and drying.

—Kenneth R. Greer

If a fuzzy-faced critter asks to check your license, it isn't necessarily a Fish and Game employee who forgot to shave. It might be Paddy, the District I mascot, and right hand (or paw) to District Warden Supervisor Ross Wilson. Paddy is a yearling mountain lion with all the claws and teeth of his kind but not the temperament. He has been raised in captivity by Ross since he was caught as a kitten by State Warden Lorney Diest. This is his story.

5 a.m.—I'm getting a little shut-eye on my favorite sack, dreaming of a few cats I've met when the phone jangles. Spotlighters are at work—my job—get 'em.

We are sauntering along the boulevard after a cup of java at Joe's when I spot this suspi
"O. K. Mac," I says, "what gives?" My keen nostrils detect the odor of freshly killed deer so I kno

I wasn't born yesterday so I climb in to c
the furniture for fingerprints and note a d
floor. So I lift up the blanket—It's there alr

The guy folds up like an accordia
spaghetti," he says—"just had to
"Tell it to the Judge," I tells him, "y
"What's that," he says?—"Taking f
"Catnapp

Maximum sentence for this fe
or $27.50—File re

ny assistant who's the sleepy
nd clue him on the call from
'poachercide division."

It looks like a clear cut case so I whisper a few words of advice.

s looking character.
've got him with the goods.

the joint. I dust
of blood on the
—whitetail deer.

'I was tired of eating
ve some fresh meat."
going in on a 1014½."
from a cat," I says—
."

ery is 2 years at hard labor
ded—Case closed.

—Photos by Ken Thompson

He numbles something about the blanket covering up his tired old "gramma."

WATER POLLUTION ABATEMENT AND CONTROL FOR MONTANA

By John C. Spindler, Pollution Control Biologist
Montana Fish & Game Department

"In the beginning God created the heaven and the earth . . . And God said, let the waters under the heaven be gathered together unto one place and let the dry land appear: and it was so . . . Let the earth bring forth grass, the herb yielding seed, and the fruit after his kind . . . Let the waters bring forth abundantly the moving creatures that hath life, and fowl that may fly above the earth in the open firmament of heaven . . . Let the earth bring forth the living creature after his kind . . . Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth."—Genesis.

In this sequence of events, created by His hand, we have first of all, the earth, with its land and water, then animals to use the earth for their perpetuation and finally man, as God's trustee to all these earthly blessings. How many times during the course of our lifetime do we violate this trust:—the trust that we shall use wisely all the natural resources?

One of these major violations is the pollution of our streams and lakes through disposal of large amounts of domestic and industrial wastes with no thought of the effects of such materials upon the water or watershed. Many people realize the importance of pollution control. Others are indifferent to the effects of pollution while still others are opposed to any type of waste treatment since it costs money.

Water pollution may be defined as "the act of rendering unclean; defiling; desecrating; or contaminating" or "the addition of anything to water which changes its natural qualities so that the user does not have the natural water transmitted to him." For our purposes, we can accept the latter definition, for water use must be considered when defining pollution. Pollutants which adversely affect the quality of drinking water may not affect the quality of the water for industrial use. However, the contention that "what is good for humans, is good for fish" is, in many cases a fallacy.

For example, water contaminated by untreated domestic sewage sometimes produces more and larger fish than the same water above the entrance of the sewage. Still, this polluted water, even with chlorination, would be unsuitable for culinary use. By the same token, a stream polluted by silt for a number of years would

—Photo by John Spindler

Fig. 1—Silt-laden waters of the Sun River empty their muddy cargo into the Missouri.

eventually be "smothered out;" fish food production of the stream would be reduced and spawning beds would be coated with silt. Yet simple filtration would render the water suitable for drinking.

Other types of pollution may not be as readily recognized. In many cases a crystal-clear stream may carry enough dissolved materials (Particularly heavy metal ions) to completely kill out a game-fish population, yet the water could meet public health standards.

THE EFECTS OF DOMESTIC & INDUSTRIAL WASTES ON FISH

DIRECT EFFECTS

Overwhelming — usually by silt, sawdust, planer shavings, and other materials carried in suspension. Siltation (Fig. 1) sometimes occurs naturally but is generally an indirect effect of overgrazing or other poor land use. Most game fish can exist in muddy water during the short periods of early summer run-off but if subjected to extended periods of time in silty water, evenutally die or move out.

The practice of dumping sawdust into streams has been prohibited by State law for many years but it still exists. Prolonged periods of exposure to sawdust and planer shavings kills fish and other life within the water or causes them to move from the contaminated area.

The overwhelming action on game fish by oil sludges being carried in suspension is obvious. Such material is difficult to eliminate by the natural purification of water, and thus, has a deleterious effect for many miles downstream from its point of entrance.

Temperature—The disposal of cooling water by industry can warm streams so much that many water-dwelling animals are unable to live there; thus, fish production is re-

duced. In general, cold-water fish do best in waters with a maximum temperature of less than 70° F. This problem has not been of importance in Montana in the past but most certainly will present itself as industry is expanded.

Suffocation — This problem generally presents itself in one or two ways: (1) reduction of dissolved oxygen in the water and (2) coating of gills (breathing apparatus of fishes) with materials which prevent them from functioning.

Fig. 2—Effluent From Improperly Treated Sewage.
—Photo, State Board of Health

Dissolved oxygen in water is used up by the decomposition of plant or animal wastes and by the direct combination of oxygen with waste materials from industry. Generally, the reduction of dissolved oxygen results from discharge of raw sewage into streams (Fig. 2). The decomposition of sewage in water requires oxygen and often uses it faster than it is replaced to the water. Under light pollution loads or under conditions where sewage is greatly diluted by the receiving waters, game-fish are replaced by rough fish, the latter being able to live with less oxygen. But as the sewage load increases, all fish life and nearly all air-breathing animals are excluded. It is then that the foul odor of sewer gases (hydrogen sulfide and methane) become prevalent. Under these conditions only those animals with special adaptions for breathing are found in septic zones of pollution. Such animals are used by biologists as indicators of pollution. The absence of the clean-water forms such as salmon flies, caddies flies, may flies and their immature forms, helgramites and rock worms, and the presence of the polluted water forms indicate that a stream is receiving excessive amounts of raw sewage or other organic wastes.

Many materials, such as zinc, can cause suffocation by preventing the entrance of oxygen into the bloodstreams of the fish through the gills. Most ore-mill wastes contain dissolved metallic compounds that, under certain conditions, cause fish to excrete an excessive amount of mucous from the gills. This mucous coats the gills and hampers respiration.

Toxic—The direct poisoning effects of gases, oil and tar wastes and mine-mill wastes are apparent. Minute traces of arsenic, cynide, and the heavy metal ions in soft waters are extremely toxic to game fish and will soon completely wipe out a fish population.

Other direct effects: Irritants, such as caustics (Fig. 3) may cause an actual breakdown of fish tissue (skin,

—Photo by John Spindler

Fig. 3—Pulp mill wastes have a high dissolved oxygen demand and often contain caustic compounds.

gills, digestive tract). Brine from oil fields, discharged into streams, can raise the salt content of the water so that game fish are unable to live.

INDIRECT EFFECTS

The direct effects of pollution are sometimes evidenced by fish kills which result from large quantities of the pollutants being discharged into the river at one time. Recent examples of this are kills resulting from the use of insecticides and pesticides (DDT, grasshopper poison, cattle and sheep dip) near streams.

Possibly, the indirect effects of pollutants, which are not so spectacular, are of more importance since they represent a constant source of pollution which in many cases have cumulative effects. They pile up very slowly with the same end results as slugging a stream with large volumes of deleterious substances. This is the type of pollution which must be carefully policed.

Wood fibers from pulp mill operations, while not poisonous, can eventually "smother out" the bottom of a stream or lake, destroying the ability of that stream or lake to produce fish food. In addition, such fiber can destroy spawning areas by excluding the oxygen so necessary for the development of game fish eggs buried in the gravel.

Exposure of fish and other water animals to unfavorable conditions tends to lower their vitality, shorten their life span and reduce their natural ability to cope with disease. Some materials, such as phenolic compounds from coal-char (coke) plants and oil refineries and mercap-

—Photo by John Spindler

Sawdust piles along stream banks are potential pollutants.

tans from sulphate pulp mills, impart an undesirable odor and flavor to fish. In addition, the recreational value of a body of water is most certainly lessoned by an oily film resulting from improper treatment of refinery wastes. Waterfowl and aquatic mammal use of a watershed can also be adversely affected by oil wastes.

We all realize that the space age will most certainly increase the demand on our natural resources and as the population of Montana increases, thereby creating a ready market for commodities, industry will move closer to its sources of raw materials. With this expansion, the demand for water will increase, both for direct use by industry and municipalities and for carrying wastes. It is the contention of pollution control authorities everywhere that proper waste disposal should be provided for in the original building plans of industrial plants. Most industrialists will readily agree that wastes from their plants can be effectively treated, resulting in removal of poisonous substances and reduction of dissolved oxygen demand. We can "have our cake and eat it too" so to speak, since our water resources can be counted upon to carry light loads of pollution within certain water quality standards maintained by state governmental authorities.

The enforcement of the Montana water pollution act rests with a water pollution council, and the State Board of Health is charged with its administration. A biologist has been assigned to the board of health by the Montana Fish and Game Department to aid the council in classification of our waters as a basis for pollution control and abatement and to supply the council with information necessary for the enforcement of the water pollution act.

Most conservationists agree that habitat destruction is the major cause for decreased fishing success. Some conservationists suggests that a habitat control program within conservation departments is necessary for proper and efficient coordination between all agencies concerned with land and water use. This suggestion has merit since it would fulfill a need for coordinated representation of conservation interests on planning boards concerned with development of our natural resources. Many times, the knowledge of impending danger to fish and wildlife habitat by development projects comes too late for conservationists to take steps necessary to protect fish and game interests. It is felt that the assignment of the biologist to the State Board of Health water pollution control program by the Fish and Game Department will tend to lighten the load placed on the small staff which has had to handle pollution problems concerning public health as well as fish and wildlife and, in addition, will insure the fishing and hunting license buyer a voice in pollution control as it concerns fish and game.

CHILDREN'S PAGE COLOR

This little deer is cozy in his forest bed. He is not lost, so don't bother him. His mother will return when you have gone.

BIG GAME-LIVESTOCK COMPETITION ON MONTANA'S MOUNTAIN RANGELAND'S

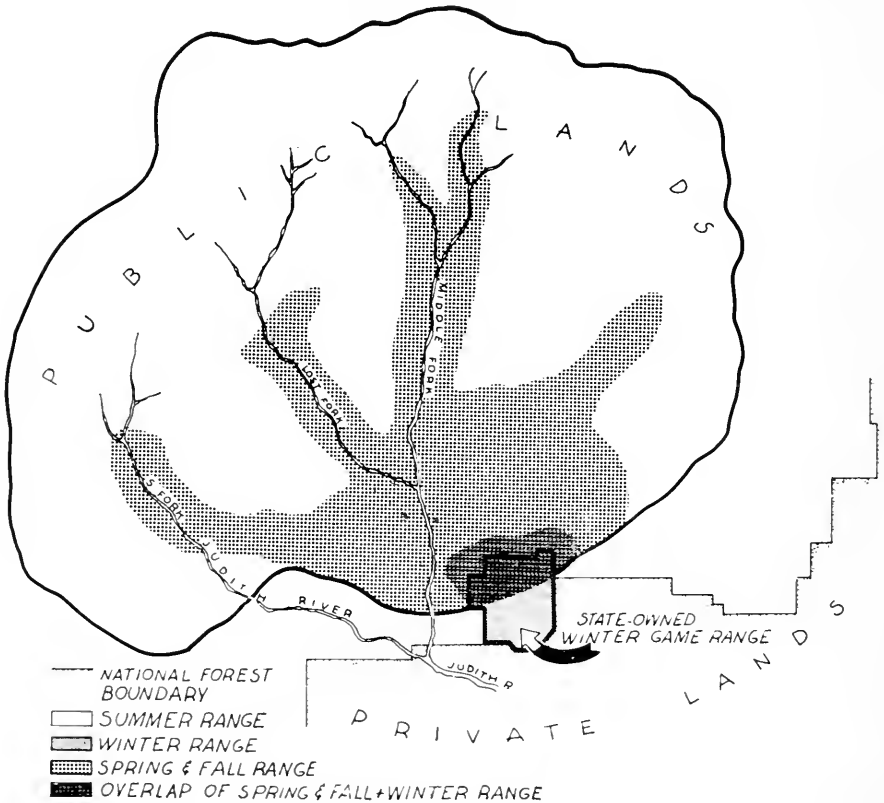
This report will attempt to point out some of the basic principles and management practices which relate to the subject of big game-livestock competition. Basic principles involve considerations of the various seasonal ranges used by game and livestock and the overlap in food habits in these ranges. Management practices involve considerations of the various courses of action used to alleviate competition. The big game animals referred to are deer and elk. Livestock are sheep and cattle.

—Glen Cole, Range Biologist

SEASONAL RANGES

Foothill Ranges

Snow and inclement weather force deer and elk to concentrate on restricted range areas during the winter. These areas are generally located on south-facing slopes along the foothills of mountain ranges. During other seasons, deer and elk are dispersed over relatively large range areas at high elevations. The relationships of the various seasonal game ranges are illustrated below. It is basic that the available forage on the relatively small winter range



Diagramatic illustration of seasonal elk ranges in relation to state-owned winter game range.

These elk have more than adequate forage on their high elevation summer range, but the supply of forage on the foothill area where they spend the winter is limited.

—Photo by Hector LaCasse

limits the size of deer and elk populations.

Deer and elk winter ranges are usually on lands which lie within or adjacent to National Forest boundaries. These lands may be either privately or publicly-owned. Privately-owned lands may be grazed by livestock during any or all seasons, but the usual situation is to have the animals on feed lots during the winter. The seasons of livestock use on the publicly-owned forest land are generally summer and fall.

Intermediate Elevation Ranges

With moderating spring weather, deer and elk leave foothill winter ranges and disperse over range areas at intermediate elevations. These same intermediate elevation ranges are used again during fall and in mild winters they may serve as the winter range. Forage supplies on these ranges are generally adequate for game, but exceptions have been noted.

Intermediate elevation ranges are generally on public lands administered by the U. S. Forest Service. Livestock may use these same ranges during summer and fall. Livestock distribution may be curtailed as on high elevation ranges (see below) or it may be uninhabited by virtue of gentle slopes and adequate water facilities.

High Elevation Ranges

With the onset of summer, deer and elk travel to range areas at high elevations. The supply of forage on these ranges is usually more than adequate for game.

High elevation ranges are usually on public land within National Forest boundaries. Summer and fall livestock grazing is permitted under a multiple use policy. As a rule, sheep and cattle use only portions of the total high elevation range area available for game. Steep slopes, limited water supplies, dense timber and animal habits serve to concentrate cattle on restricted range areas. Sheep are less affected but their range area is still more restricted than that of game. It is basic that the number of livestock on a high elevation range is limited by the available forage on the portions of the range where they tend to concentrate. The usual places of concentration are meadows and parklands adjacent to water.

BIG GAME-LIVESTOCK FOOD HABITS

Browse, Forbs and Grass

Numerous studies of big game food habits have been conducted in Montana and other western states. Considerable information is also available from studies of livestock food habits. The results from these studies have shown that big game and livestock have marked preference for one or more classes of forage during certain seasons. These three recognized classes of forage are browse, forbs and grass. Browse is a term used to describe various woody shrubs and trees. Forbs are commonly known as weeds. The forage class referred to as grass generally includes other grass-like plants such as sedges.

Deer

Browse is the major class of forage used by deer during the winter. Forbs and browse are the major classes of forage used during the spring, summer and fall. Forb use is generally highest during the summer. Grass is a relatively minor deer food during all seasons, but greater amounts are used during spring.

Elk

Either browse or grass may serve as the major class of forage for elk during spring, fall and winter. Browse is generally more important where elk inhabit timber and brush areas. Grass is generally more important where the animals can obtain forage from open grassland areas. Browse and grass may also be used during the summer, but the results from Montana, Colorado and Oregon studies indicate that forbs make up the greater part of the summer elk diet. It was also found that forbs were important elk food during late spring and early summer.

Timber types furnish considerable forage for Elk. Note abundant forb and grass growth.
—Photo by Hector LaCasse

Sheep

Various studies suggest that the seasonal use of browse and forbs by sheep is similar to that of deer. However, sheep appear to use greater amounts of grass than deer during all seasons.

Cattle

Most studies show that grass is the major class of forage used by cattle during all seasons. However, cattle may use substantial amounts of browse or forbs on some ranges. Certain browse species are particularly palatable to cattle during fall, winter and spring. Certain forb species are palatable during the late spring and summer.

Overlaps in Food Habits

The foregoing considerations indicate that there is some overlap in big game and livestock food habits.

However, the actual extent of overlap is determined from considerations of use on plant species. Plant species of the same forage class may serve as preferred food for one kind of animal, but not for another. As a rule, big game and livestock have the greatest opportunity to choose from a variety of plant species during the summer, less of an opportunity during spring and fall and the least opportunity during winter. In addition, overlaps in forage choice are influenced by animal grazing habits. Preferred forage is grazed first. If one kind of animal overgrazes the forage plants which it alone prefers, it must then use other plants which may be important to another kind of animal.

In general, big game and sheep will use the same browse species. Cattle tend to make little use of most coniferous browse species, but certain others may be used during spring, fall and winter. Supplies of forbs are generally too abundant to have competition for this class of forage. In addition, the species heavily used by game appear to be relatively unpalatable to livestock. Game and livestock preferences for certain grass and sedge species may overlap or be far apart, depending upon such things as the stage of plant maturity, the season of range use and the presence of other forage species. In most cases, the grass species preferred by elk during the winter are also preferred by livestock.

Grassy parks are used by small groups of elk during the summer, but examinations of feeding areas reveal that weedy forbs are the major class of forage being used.

—Photo by Hector LaCasse

COMPETITION

Conditions Necessary for Competition

The following set of conditions are necessary for competition between big game and livestock:

1. that game and livestock use the same range areas.
2. that game and livestock use the same forage plants.
3. that the forage plants are an important source of forage for either game or livestock.
4. that the forage plants are in limited supply or deteriorating in production as a result of combined use.

It is not necessary that game and livestock use the same area or forage plants at the same time. Use during any one particular season may have an effect on the forage available during another season. A further consideration is that competition will not occur on ranges where the supply of forage is adequate for both game and livestock.

On Foothill Ranges

From the considerations thus far, it is apparent that the chances for competition are greatest on the foothill range areas where big game concentrate during the winter. This is largely because game animals on these ranges are usually contending with a limited forage supply. If deer or elk are dependent upon a limited browse supply for winter forage, competition will usually result from any season of sheep grazing and all but the summer season of cattle grazing. Exceptions would occur only where the browse species were unpalatable to livestock. If elk are dependent upon a limited grass supply on a foothill winter range, any season of livestock use on the same range area will generally result in competition.

On Intermediate Ranges

The chances for competition on intermediate ranges are far less than on foothill ranges. This is largely because big game is dispersed over a relatively large area during the spring and fall. Much of this range area may also be inaccessible to livestock. In addition, spring and fall use on grasses and forbs has been found to be far less harmful than was previously supposed. Spring grazing occurs at a time when soil moisture and plant storage reserves (in the roots) are adequate for regrowth. Fall grazing is on plants in a near or complete stage of dormancy. Plants are most affected by summer grazing. At this time storage reserves are at a minimum and soil moisture is insufficient to permit re-growth of forage. In most instances, competition between game and livestock will be non-existent on the portions of intermediate ranges where livestock grazing is gauged to take no more than about 40% of the herbage production of grass plants. This level of use is considered proper grazing and will maintain plants in good condition.

On High Elevation Ranges

The chances for competition on high elevation ranges are usually even less than on intermediate ranges. This is because livestock grazing is usually confined to a relatively small portion of the total high elevation range area. Big game has access to the same areas used by livestock, but there appears to be very little overlap in food habits under summer conditions. In addition, since big game usually has access to a relatively large area, even the heaviest intensities of livestock grazing will not have any significant effect on game forage supplies. As a general rule, livestock grazing on high elevation ranges stands a greater chance of competing with watershed values than with game. It follows, that complete removal of big game from a high elevation range will not permit increases in livestock. Similarly, under the conditions existing in Montana, complete removal of all livestock from a high elevation range will not permit increases in big game populations. This is because **game numbers are limited by the available forage on the relatively small winter range**

In deep snow areas, elk are dependent upon browse for winter forage. Only the terminal growth of browse represents the food supply.
—Photo by R. H. Cooney

areas which are located along the foothills of mountains.

Big game is often considered a factor in causing deteriorating forage conditions (grass replaced by weedy forbs) on areas heavily grazed by livestock. In view of recent Montana studies which found that forbs were a preferred forage for deer and elk during late spring, summer and early fall, we would expect that game use on heavily used livestock areas was, in reality, a response to a concentrated source of forbs. It is a moot question whether this game use is not the result of deteriorating forage conditions rather than the cause.

MANAGEMENT PRACTICES

Montana's game managers are obligated to investigate situations where big game and livestock may be competing for forage. If investigations reveal that competition is occurring on public lands, the courses of action available to game managers are:

1. Attempt to obtain agreements with forest officials and livestock permittees on an equitable allocation of forage for game and manage game accordingly.

2. Attempt to obtain agreements on retiring key winter areas for game. Compensate for such retirements by reducing game populations in adjacent areas to non-competing levels.

If investigations reveal that competition is occurring on private lands, the courses of action available to game managers are:

1. Reduce game populations to levels where they are not competing with livestock.

2. Arrange for the acquisition of strategically located rangeland areas for game. Once a rangeland area is acquired, competition on adjacent private lands may be alleviated by liberal hunter harvests and extended seasons.

Acquistion of Big Game Winter Ranges

Throughout western and central Montana, the pattern of land ownership results in many deer and elk winter ranges being located on private lands which are ajacent to National Forests. The public-owned forest lands furnish forage for game during the spring, summer and fall under conditions where competition with livestock is either at a minimum or non-existent. However, competition between game and livestock may be intense on lands which furnish forage for game during the winter—particularly in the case of elk. Private landowners cannot be expected

A group of elk on a state-owned game range. Grass is the principal winter food of elk on foothill ranges where snow depths are not excessive.

to support large numbers of elk at the expense of their livestock operations.

The initial benefit of a state-owned winter game range is, of course, the alleviation of conflict with livestock operations. Further benefits relate to the fact that an established winter game range is a stabilizing factor in elk management. This largely results from the animals having a permanent source of forage for the critical winter season. Under these conditions, elk populations can be managed to produce the maximum number of harvestable animals each year and for many years to come.

It is our belief that criticism of the program which provides important big game herds with a winter range, largely stems from our own failure to acquaint people with the facts. A common misconception concerning state-owned game ranges is that they are off the "tax rolls." In all cases an amount "in lieu of taxes" is paid to the county in which a state-owned game range is located. These annual payments are determined by local county assessors and are equal to the taxes paid on adjoining lands of comparable value. Over the state as a whole, the lands suitable for development as winter ranges are limited and they can never represent more than a relatively small area. However, the acquisition of certain strategically located rangelands is the key to resolving competition with livestock over relatively large areas. Since a state-owned winter game range simply transfers elk use from private to public lands, they cannot be expected to materially increase elk populations. In some instances, an acquired range area will have sufficient forage to permit increases. In others reductions from former numbers will be necessary.

Considering both the alleviation of conflict and the permanent source of recreation which results from the acquisition of a winter game range, it is doubtful whether any other expenditure for big game management will provide so many benefits for so many people over such a long period of time. In many states, the expansion of agriculture into foothill mountain areas has resulted in the elimination of native elk populations. Perhaps no state has demonstrated as well as Montana that the acquisition of relatively small winter ranges is the means of having both elk and agriculture. We would like to think that this is the program preferred by the majority of Montana's citizens.

MONTANA WILDLIFE FEDERATION —A JOB TO DO

By Tom Deckert, President

The operation of a state wildlife federation is more than a full-time job for any small group of men. It is doubtful if any organization, commercial or non-private could pay for all the personal services that are required, even at a moderate hourly rate. Truly, wildlife conservation is a "labor of love" and whatever its motives or origin, none can today accuse a progressive federation of being merely a selfish-interest group. The multitude of interests evidenced by the men who gather together to share their enthusiasm for outdoor recreation reads like a listing of hobbies, types of recreation and the natural sciences in a modern encyclopedia!

These organizations exist and progress upon meager budgets. Some of them, unfortunately, are more proud of the meagerness of their budgets than of their accomplishments. While there is much to be said for keeping dues at as low a figure as possible and for as economical operation as possible, a federation is in danger of losing light of its objectives if pennies are pinched too greatly. Stagnation due to lack of finances destroys pride in the organization. Like it or not, hunting and fishing clubs, admittedly the least costly of all organizations, must keep up with the financial times. A dollar is worth only what it will buy.

An organization whose sole requisite for membership is the enjoyment of outdoor recreation is a diverse one. Every trade, profession and walk of livelihood are represented. As a general rule, the only common denominator is a liking for some form of recreation and, naturally enough, each individual thinks of his favorite form of relation to his likes and dislikes, as well as his experience and training. Consider the divergent viewpoints of a farmer, a department store floor-walker, a physician and an automobile mechanic. Normally, none of these would regard himself as expert at the other's calling but such tolerances quite frequently fly out the window when recreation comes in the door, and all become self-confessed experts upon upland birds, deer, elk, goats, antelope, or some other form of wildlife or fish.

Yet outdoor recreation has been the real eye-opener in allowing the public to see what happens to a plundered planet. And these men, despite the variance in their callings —and even in their chosen forms of recreation have been stimulated to become the champions of our natural resources, the voice that shouts for the conservation of those resources. The greatest service a state federation can render is to make its members—these men—and others of the general public—see that resource management is a job for trained men,

MONTANA WILDLIFE FEDERATION OFFICERS—1958

Back row (L-R): Robert Larimer, 1st Vice President, Glendive; Leland Schoonover, Treasurer, Polson; Front row (L-R): Virgil Janes, 2nd Vice President, Helena; Tom Deckert, President, Billings.
—Photo by K. F. Roahen

that their greatest service can, in turn, be rendered by clearing the way for the trained men to do a job.

Resource management is today a recognized profession but no one should assume that there are cut-and-dried techniques which can be applied to any given situation. On the contrary, the complexity of the management job and the acknowledged low status of present knowledge need stressing at every possible opportunity. Nowhere is a greater educational job needed than in convincing the public that it should seek out, then abide by, the best technical advice available upon the management of the wildlife resource.

Presto! A major project for the state federation—the performance of that educational job upon both youth and adult. The project cannot even start there, for it must actually begin with the federation's educating its **own membership.**

There is a fundamental difference between education and information. The former is the development of a philosophy. The latter is the acceptance of factual material. Conservation **education** will require much careful planning and a longer time than we like to believe. Conservation **information** on the other hand may be presented and understood in the time it takes to tell it.

Real education, like charity, begins at home. Therefore, before the federation can seriously aspire to educate others it must be first assured that its own members understand and subscribe to the broad principles the federation seeks to teach. Toward this end, the Standard Committee system is the best tool with which to accomplish the task—a task, remember, that is desperately needed.

Cute, but possessing the vicious nature common to the weasel family, the pine marten is a dweller of deep evergreen forests. Marten are at home both on the ground and in the trees. Even the agile pine squirrels can seldom escape him.

—Photo by Fletcher Newby